

*Private Fuel Storage, L.L.C.*

*P.O. Box C4010, La Crosse, WI 54602-4010*

*Phone 303-741-7009 Fax: 303-741-7806*

*John L. Donnell, P.E., Project Director*

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D.C. 20555-0001

January 14, 2000

**COMMITMENT RESOLUTION LETTER # 24, SER OPEN ITEMS**  
**DOCKET NO. 72-22 / TAC NO. L22462**  
**PRIVATE FUEL STORAGE FACILITY**  
**PRIVATE FUEL STORAGE L.L.C.**

- Reference:
1. December 10, 1999 telephone call between Private Fuel Storage (PFS), Stone and Webster (S&W) and the NRC
  2. NRC Letter, Delligatti to Parkyn, "Safety Evaluation Report For Systems Not Directly Associated With Storage Casks (TAC No. L22462), dated December 15, 1999
  3. January 7, 2000 telephone call between Private Fuel Storage (PFS), Stone and Webster (S&W) and the NRC/CNWRA

On December 10, 1999 a conference call was held between the NRC, Private Fuel Storage (PFS) and Stone and Webster (S&W). The purpose of the call was for the NRC to identify open items/outstanding issues remaining in their review of the Private Fuel Storage Facility (PFSF) Safety Analysis Report. The open items discussed during this call were those that are not listed as open items in the Safety Evaluation Report (SER) issued with the Reference 2 letter. A subsequent phone call was held, Reference 3, to discuss the open items in greater detail. The open items discussed in the phone calls, References 1 and 3, and the proposed resolutions are provided below as items 1 through 23. The open items identified within the SER, Reference 2, and the proposed resolutions are provided below as items 24 through 30. The scheduled resolution date for each open item is provided with the response.

The following open items are associated with Chapter 5, "Installation and Structural Evaluation", of the SER:

*NMSSOI Public*

*PDR ADOCK 07200022*

**Canister Transfer Building (CTB)**

1. It appears the CTB was analyzed for the worst-case loading condition only. PFS should provide more detailed information on the other load cases that are described in Section 3 of the PFSF SAR.

RESPONSE - Because of the high seismic loads and relatively low or non-existent loads from other abnormal conditions (e.g. tornado and accident pressure loads), the seismic loads will govern the design. The SAR will be revised to provide a discussion of all the load cases considered in the design of the CTB and why these two load cases are considered to govern the design. As stated in SAR Section 4.7.1.5.1, "During the detailed design phase, all load cases as described in Chapter 3 and all areas will be addressed in detail."

This information will be included in a License Amendment submitted by January 24, 2000.

2. PFS should verify that the worst-case load combination for all critical areas is seismic.

RESPONSE - See response to Item 1 above.

3. Crane loads provided by the Vendor and used in the CTB design will increase due to the latest dynamic soil properties. Has this been included in the design (check NUREG 0612)?

RESPONSE - See response to Item 14 below.

4. Provide design information and define critical elements of major CTB components, including cask loading/unloading bay, 3 cask transfer cells, 200-ton overhead bridge crane, 150-ton semi-gantry crane, crane runway, girders and supports, cask transporter bay, tornado missile barriers, LLW storage room, radiation shield walls and doors, equipment laydown areas, storage cask delivery and staging area, and mechanical/electrical equipment areas.

RESPONSE - After discussion of the responses to Items 1, 2, 6 through 10, and 12, it was agreed that these responses and associated SAR updates adequately demonstrate the structural adequacy of the CTB. Regarding other details of the building, PFS will revise the SAR to include identification and discussion of radiation shield walls, tornado missile barriers, and fire rating of walls and doors. PFS will review the information currently provided in the SAR for the CTB mechanical and electrical systems to ensure that the industry codes and standards that will be used for design and construction are clearly identified. Additionally PFS will ensure that information

provided for both cranes includes a discussion on potential liftoff during a seismic event and crane operability after a seismic event (see Item 13, 14, and 15 also).

This information will be included in a License Amendment submitted by January 24, 2000.

5. Provide details of the large sliding doors in the canister transfer cell walls. These are provided for shielding, and PFS must demonstrate that they will stay in place during all loading conditions.

RESPONSE – The SAR will be revised to include a discussion of the design requirements (i.e., seismic, radiation shielding, and fire rating) and applicable industry codes and standards for these doors.

This information will be included in a License Amendment submitted by January 24, 2000.

6. PFS should confirm that the seismic analysis has been updated to reflect the latest Probabilistic Seismic Hazard Analysis.

RESPONSE - S&W Calculation entitled “Seismic analysis of Canister Transfer Building”, (Calculation number 0599602-SC-5, Revision 1) was submitted to the NRC via letter, Donnell to U.S. NRC, dated September 9, 1999. This calculation reflects the latest Probabilistic Seismic Hazard Analysis (i.e., the latest soil properties and 2,000 year Return Period Design Ground Motions). Additionally the latest Probabilistic Seismic Hazard Analysis was included in SAR revision 5.

7. PFS should confirm that the seismic analysis has been updated to reflect the latest soil data/investigations that were used to develop the soil impedance functions in the model.

RESPONSE - S&W Calculation entitled “Development of Soil Impedance Functions for Canister Transfer Building”, (Calculation number 0599602-SC-4, Revision 1) was submitted to the NRC via letter, Donnell to U.S. NRC, dated September 9, 1999. This calculation develops impedance functions using the latest soil data/investigations. These impedance functions were then used as inputs for the seismic analysis (Calculation number 0599602-SC-5, Revision 1) of Canister Transfer Building. The latest soil properties were included in SAR revision 6.

8. The CTB was modeled using a 3-D lumped mass system. Does the lumped model account for local response of the roof and wall panels under seismic loading?

RESPONSE – Yes. Lumped mass points 5 and 6 of the model developed in the “Seismic Analysis of Canister Transfer Building”, (Calculation number 0599602-SC-5, Revision 1) were included to account for local flexibility of the roof and wall panels, respectively. This is described in SAR Section 4.7.1.5.3 in the 5<sup>th</sup> paragraph.

9. Dynamic analysis was performed using the computer program "FRIDAY" to develop response spectra at critical locations. Results were integrated into the 3-D model using the ANSYS program. Why was the 3-D model not subjected to the earthquake time history input to develop stress levels automatically?

RESPONSE – The ANSYS model does not properly account for dynamic soil-structure interaction effects, such as input of free field ground motions and radiational damping. The “FRIDAY” program has the capability to include soil impedance functions that do account for soil-structure interaction effects. The soil impedance functions are developed from the dynamic soil properties using the S&W program “REFUND”. The input ground motion is applied at the free field.

10. In the ANSYS analysis, only 2 load cases were presented. Provide justification for ignoring other load cases with supporting details.

RESPONSE – The two load cases selected for preliminary design were chosen because they produce the worse downward loading and the worst overturning loads. These two cases will envelope the design of the building. The SAR will be revised to provide a discussion of all the load cases considered in the design of the CTB and why these two load cases are considered to govern the design. All additional load cases will be documented in the final design calculations.

This information will be included in a License Amendment submitted by January 24, 2000.

11. Results of the ANSYS analysis were used in design of reinforced concrete. Design of overall structure was provided, but not for local areas. Provide design details for all openings & wall/roof interfaces.

RESPONSE – After the additional explanation provided during the discussion of Items 1, 2, 6 through 10, and 12, it was agreed that these responses and associated SAR updates adequately demonstrate the structural adequacy of the CTB. Design details for all local areas are not required at this time. As stated in SAR Section 4.7.1.5.1, “During the detailed design phase, all load cases as described in Chapter 3 and all areas will be addressed in detail”.

### **Earthquake Duration**

12. PFS must demonstrate that a 15-second earthquake is appropriate and conservative, considering standard engineering practice and the seismic event at the PFSF site. Conclusions in the SAR are based on a deterministic time history approach using a 15-second Italian earthquake as being representative of the site. Based on other recent seismic events, with 30 to 40 second earthquakes, confirm that the earthquake duration is justified. (Ref 10CFR72-102.a,b, f).

RESPONSE – SAR Section 4.7.1.5.3 describes the development of the time histories used in the design of the CTB. A 3-D artificial earthquake of 30 seconds was developed to simulate the ground motion. The earthquake duration was reduced to 20 seconds for analysis of the Canister Transfer Building. The time histories meet the requirements of the Standard Review Plan (NUREG 0800) and ASCE 4-86. Since a linear elastic analysis was performed, an earthquake record longer than a 20-second duration would not have any additional effect on results. The “Seismic Analysis of Canister Transfer Building”, (Calculation number 0599602-SC-5, Revision 1) describes the input of the time histories to the analysis of the Canister Transfer Building.

### **Crane Design**

13. PFS must demonstrate the structural integrity and functionality of the overhead bridge and semi-gantry cranes under appropriate seismic loadings and uplift conditions. The cranes are Important to Safety and must be demonstrated to be capable of performing their intended functions under all loading conditions.

RESPONSE – In Safety RAI No. 1, question 4-2, the NRC requested that PFS “Provide the detailed design analyses for the overhead and semi-gantry cranes that demonstrate they meet the criteria specified in ASME NOG-1.” In response to this question PFS prepared a crane specification, obtained and evaluated bids from various vendors, and awarded the crane design, fabrication and testing to EDERER, Inc. The Crane analysis, drawings, and reports that were prepared and submitted to the NRC (PFS Letter, Parkyn to U.S. NRC, Response to Request for Additional Information, dated February 10, 1999) with the RAI response are listed below:

#### 200/25 TON BRIDGE CRANE

Attachment 1 includes the following design drawings and documents for the Private Fuel Storage Facility 200/25 ton Overhead Bridge Crane:

- Appendix B Supplement To Generic Topical Licensing Report Edr-1, Rev. 0, Facility Specific Crane Data, 200 Ton Bridge Crane

- Appendix C Supplement To Generic Topical Licensing Report Edr-1, Rev. 1, Summary Of Regulatory Positions, 200 Ton Bridge Crane
- Seismic Qualification Analysis, December 1998 (200 Ton Overhead Bridge Crane)
- Technical Description Of Hoist And Traverse Motion Electrical Controls System (150 & 200 Ton Cranes), Ederer Document Ea-37547, Rev. B
- Technical Description Of Radio Controls Systems (150 & 200 Ton Cranes) Ederer Document Ea-37548, Rev. A
- Ederer Drawing B-36951, Rev. A, Reeving Diagram Sixteen Parts (Main Hoist)
- Ederer Drawing B-36952, Rev. A, Reeving Diagram Eight Parts (Aux Hoist)
- Ederer Drawing B-37061, Rev. A, Main Hoist Block & Hook Dim (200 Ton Crane)
- Ederer Drawing B-37062, Rev. A, Aux Hoist Block & Hook (200 & 150 Ton Cranes)
- Ederer Drawing C-36975, Rev. A, Sister Hook 200 Ton (200 & 150 Ton Cranes)
- Ederer Drawing Pa-2189, Rev. C, Clearance Dwg. 200/25 Ton Bridge Crane
- Ederer Drawing D-36976, Rev. A, Bridge Arrangement 200/25 Ton Capacity
- Ederer Drawing B-36977, Rev. A, Trolley Arrangement 200/25 Ton Capacity

#### 150/25 SEMI-GANTRY CRANE

Attachment 2 includes the following design drawings and documents for the Private Fuel Storage Facility 150/25 ton Semi-Gantry Crane:

- Appendix B Supplement To Generic Topical Licensing Report Edr-1, Rev. 1, Facility Specific Crane Data, 150 Ton Semi-Gantry Crane
- Appendix C Supplement To Generic Topical Licensing Report Edr-1, Rev. 1, Summary Of Regulatory Positions, 150 Ton Semi-Gantry Crane
- Seismic Qualification Analysis, December 1998 (150 Ton Semi-Gantry Crane)

- Ederer Drawing B-37063, Rev. A, Main Hoist Block & Hook Dim (150 Ton Crane)
- Ederer Drawing B-36953, Rev. A, Reeving Diagram Sixteen Parts (Main Hoist)
- Ederer Drawing B-36954, Rev. A, Reeving Diagram Eight Parts (Aux Hoist)
- Ederer Drawing Pa-2190, Rev. D, Clearance Dwg. 150/25 Ton Semi-Gantry Crane
- Ederer Drawing D-36978, Rev. A, Bridge Arrangement 150/25 Ton Semi-Gantry
- Ederer Drawing B-36979, Rev. B, Trolley Arrangement 150/25 Ton Capacity

The information provided above clearly demonstrates that the crane design complies with ASME NOG-1, meets the single-failure-proof requirements of NUREG 0554, and is seismically qualified. The design specification for the "Overhead Bridge Crane and Semi-Gantry Crane", specification No. 0599602-M001, Revision 1, dated September 16, 1998, Section 3.5.8.1, General Seismic Requirements, states the following:

"The Seller shall qualify the canister transfer building cranes and associated equipment to the specified seismic environment utilizing the dynamic analysis method of seismic qualification in accordance with ASME NOG-1 and the requirements of this specification. It is not a design requirement that the crane be operable during an earthquake nor that it be operable after an earthquake, although the latter is desirable. The following is mandatory:

- a) The crane bridge (gantry) and trolley are provided with suitable restraints so that they do not leave their rails during an earthquake.
- b) No part of the crane shall become detached and fall during an earthquake.
- c) The crane load shall not lower in an uncontrolled manner during or as the result of an earthquake."

The failure of a crane during canister transfer operations is discussed in SAR Section 8.1.1.3. This section states that with a canister loaded into a transfer cask, a loss of electrical power will delay the transfer operation but will not challenge the integrity of the canister or safe storage of the spent fuel in the canister. There are no safety concerns associated with storage of a canister in its transfer cask until electrical power is restored and the canister transfer operation can resume. The transfer casks are designed to provide adequate shielding and decay heat removal from the canisters. Therefore the canister is in an analyzed condition at all times during the transfer operation. Additionally, the crane design specification requires that the crane design

include the ability to manually release the hoist, emergency, bridge, gantry, and trolley brakes to allow for controlled lowering and positioning of the load in the event of an emergency.

The design specification for the "Overhead Bridge Crane and Semi-Gantry Crane", specification No. 0599602-M001, Revision 1, dated September 16, 1998, Section 3.5.3.17, requires that:

"Bridge and trolley seismic uplift restraints shall be provided if required by the seismic dynamic analysis in Section 3.5.8, Seismic Requirements. The restraint arrangements shall be such that the trolley may be located anywhere along the bridge, and the bridge may be located anywhere along the runway."

As described in SAR Section 4.7.2.5.5, the seismic analysis performed by the crane vendor indicated no uplift from a seismic event on either the bridge crane or the semi-gantry crane, therefore uplift restraints are not required. This will be confirmed as part the "Final Detailed Engineering" phase of the crane design. The cranes are designed with lateral restraints that consist of sidebars mounted next to the crane rails. The sidebars prevent any lateral movement of the bridge wheels and therefore, prevent the wheels from leaving the rails.

14. The crane analysis performed by the crane vendor is based on a deterministic seismic approach. PFS should confirm the analysis has been updated to use the latest PSHA.

RESPONSE – As discussed in SAR Section 4.7.2.5.3 "Seismic Analysis", the analyses were performed for both cranes by Anatech Corporation to qualify the crane designs for the original PFSF deterministic design earthquake (0.67g horizontal, 0.69g vertical). Although the seismic accelerations in the new design basis are lower, the revised soil properties resulted in increased accelerations at higher elevations in the building. Therefore the cranes were re-evaluated by Ederer for their seismic stability based on the current PFSF design basis ground motion of 0.53g horizontal and 0.53g vertical and resulting response spectra curves. The response spectra curves for this design basis ground motion are shown in Calculation 05996.02-SC-5 and include the effects of properties of the soil underlying the Canister Transfer Building. The Ederer evaluation and resulting minor modifications to both crane designs are also discussed in SAR Section 4.7.2.5.3. Since the modifications are considered minor and the key elements of the analysis discussed in SAR Section 4.7.2.5.3 remain unchanged (i.e., analysis methods, load cases, design allowables, models, properties and mass distribution, and response spectra), PFS believes that the evaluation presented in conjunction with the design documentation discussed in Item 13 above adequately demonstrate that the cranes will be able to perform their intended function under all loading conditions. PFS intends to formally update the seismic analysis for both

cranes as part the "Final Detailed Engineering" phase of the crane design and fabrication.

15. PFS should demonstrate that critical crane components such as wheel restraints will perform satisfactorily and prevent uplift off the rail and allow crane to be operated following a seismic event). Reference 10CFR72.24 d & i and 10CFR72.122 b, c, d, and f-l.

RESPONSE – Performance of critical components of both cranes have been demonstrated and provided. Refer to the response to Items 13 and 14 above.

The following open items are associated with Chapter 6, "Thermal Evaluation", of the SER:

#### **Chapter 6 - Open Items**

16. PFS should provide the size of diesel storage tanks.

RESPONSE – The size of the diesel storage tanks is currently shown in Section 3.3.3 of the Environmental Report.

SAR Chapter 4 will be revised to include this information and a License Amendment submitted by January 24, 2000.

17. PFS should justify why a simultaneous explosion of both propane tanks is not a credible accident scenario.

RESPONSE – Additional discussion/justification as to why simultaneous explosion of both propane tanks is not a credible accident scenario will be added to SAR Chapter 8.

This information will be provided in a License Amendment submitted by January 24, 2000.

18. PFS should provide information regarding spacing between the two propane tanks.

RESPONSE – SAR Chapter 4 will be revised to describe the spacing between the propane tanks as well as any other features required to ensure that simultaneous explosion of both propane tanks is not a credible accident scenario.

This information will be provided in a License Amendment submitted by January 24, 2000.

19. PFS should provide an evaluation of the effects of a fire on the doors on CTB. Credit is taken for the cask transporter to be outside the transfer cell during canister transfer operations, however no discussion is provided on the fire rating of the cell doors and walls. PFS needs to identify which doors and walls in the CTB are fire rated and discuss the fire rating of each.

RESPONSE –The SAR will be revised to identify all fire rated doors and walls and discuss the fire rating of each.

This information will be included in a License Amendment submitted by January 24, 2000.

20. Lightning often causes fires. PFS needs to discuss the effects of lightning strikes on the CTB and associated Structures, Systems, and Components and provide a description of the lightning protection system in the vicinity of CTB.

RESPONSE –The SAR will be revised to discuss the CTB lightning protection system and the effect of lightning strikes on the CTB and associated Structures, Systems, and Components. The discussion will include the type of system to be utilized and the codes and standards that the system will comply with.

This information will be included in a License Amendment submitted by January 24, 2000.

21. PFS should identify the type of sprinkler system to be installed in CTB and evaluate its effectiveness in controlling and extinguishing fires.

RESPONSE –The SAR will be revised to include additional discussion on the type of sprinkler system (including applicable codes and standards for design and construction) to be installed in the CTB and its effectiveness in controlling and extinguishing fires.

This information will be included in a License Amendment submitted by January 24, 2000.

22. PFS should provide an evaluation of the potential consequences of a main line locomotive fire (6,000 gal of fuel) on the spent fuel storage casks located on the cask storage pads.

RESPONSE – PFS will evaluate the requested locomotive fire and determine the consequences as well as the impacts, if any, on the facility design.

This information will be included in a License Amendment submitted in March 2000.

23. PFS should show that the design of the fire detection and suppression system is consistent with current industry standards.

RESPONSE – The SAR will be updated to provide additional discussion on the types of fire detection and suppression systems to be utilized in the CTB. Specific sections of applicable codes will be referenced and the Reference section will be revised to indicate that the latest code editions in affect at the time of design will be used.

This information will be included in a License Amendment submitted by January 24, 2000.

The following open items are those that are identified in the SER submitted with Reference 2.

24. (SER open item 1-1) The dry cask storage systems proposed for the Facility are currently under NRC review for use under the general license provisions of 10 CFR Part 72, Subpart K. Review of the cask systems for site-specific use at the Facility will be conducted when one of the cask systems is approved for use under the general license. Before a license for the Facility is issued, the applicant should demonstrate that the cask system is acceptable for use at the Facility under the site-specific license provisions of 10 CFR Part 72. Further, the applicant should ensure that cask information in the Facility SAR is consistent with the Final Safety Analysis Report for the specific dry cask storage system. The final SER will include consideration of the cask system.

RESPONSE – The PFS SAR will be reconciled with the specific dry cask storage system(s) Final Safety Analysis Report when it is issued. Any revisions required to the PFSF SAR will be made at that time and a License Amendment submitted to the NRC.

25. (SER open item 1-2) The SAR should be updated to incorporate all information that was used as the basis for demonstrating compliance with 10 CFR Part 72 including information and commitments provided in the applicant's responses to the NRC's requests for additional information (RAIs).

RESPONSE – With the issuance of License Amendments 4 through 8, PFS believes that all information provided to the NRC in Commitment letters and RAI responses that was used as the basis for demonstrating compliance with 10 CFR Part 72, has been incorporated into the PFS License Application. Commitments provided subsequent to License Amendment 8 will be incorporated in future amendments as required.

26. (SER open item 2-1) As discussed in Section 2.1.2 of the SER, the staff has determined that additional information is needed to assess the potential hazards from military aircraft flying in the vicinity of the Facility.

RESPONSE – With the issuance of License Amendments 4 through 8, PFS believes that all information requested by the NRC has been incorporated in the License Application. Additional information requests or open items identified subsequent to License Amendment 8 will be incorporated in future amendments as required.

27. (SER open item 2-2) As discussed in Section 2.1.3.2 of the SER, the staff has determined that additional information regarding the site meteorological data is needed to assure appropriate use of the information in future cask-specific analyses.

RESPONSE – Any open items regarding the site meteorological data resulting from completion of the NRC review of the cask systems for site-specific use will be resolved after receipt. Any necessary SAR revisions will be made at that time and a License Amendment submitted to the NRC.

28. (SER open item 2-3) As discussed in Section 2.1.6.2 of the SER, the staff has determined that additional information is needed to assess the affects of ground vibrations on the Facility. The applicant has requested an exemption to 10 CFR 72.102(f)(1) and proposes to use a PSHA approach with a 1,000-year return period, instead of the DSHA approach. The staff agrees with the PSHA approach, but it should use a 2,000-year return period instead of the applicant-proposed 1,000-year return period.

RESPONSE – Amendment 5 of the PFSF SAR incorporated the PSHA approach using a 2,000-year return period.

29. (SER open item 2-4) As discussed in Section 2.1.6.4 of the SER, the staff has determined that additional information regarding soil classification (e.g., detailed soil profiles) is needed to assess stability of subsurface materials.

RESPONSE – With the issuance of License Amendments 4 through 8, PFS believes that all information requested by the NRC regarding soil classification (e.g., detailed soil profiles) needed to assess stability of subsurface materials has been incorporated in the License Application.

The questions asked in the recent January 5, 2000 phone call will be addressed in a License Amendment submitted by January 24, 2000.

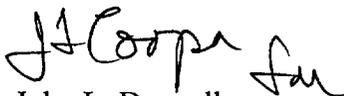
30. (SER open item 2-5) As discussed in Section 2.1.6.4 of the SER, the staff has determined additional information regarding stability of the cask storage pad and Canister Transfer Building is needed to assess stability of subsurface materials. Additional information that is required includes analyses that use cask-specific sliding resistance values and address overturning and sliding of the storage pad and Canister Transfer Building under a design basis earthquake.

RESPONSE – With the issuance of License Amendments 4 through 8, PFS believes that all information requested by the NRC regarding stability of the cask storage pads and Canister Transfer Building has been incorporated in the License Application.

The questions asked in the recent January 5, 2000 phone call will be addressed in a License Amendment submitted by January 24, 2000.

If you have any questions regarding this response, please contact me at 303-741-7009.

Sincerely



John L. Donnell  
Project Director  
Private Fuel Storage L.L.C.

Copy to:

Mark Delligatti  
John Parkyn  
Jay Silberg  
Sherwin Turk  
Asadul Chowdhury  
Scott Northard  
Denise Chancellor  
Richard E. Condit  
John Paul Kennedy  
Joro Walker